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EXAMINER	
MENON, KRISHNAN S	

ART UNIT	PAPER NUMBER
1723	

DATE MAILED: 02/17/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/914,704	DYCK ET AL.	
	Examiner	Art Unit	
	Krishnan S Menon	1723	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 January 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,19-23 and 25-44* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2, 19-23 and 25-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claims 1,2, 19-23 and 25-44 are pending in this application after the RCE of 1/7/05.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1,2,19-23 and 25-44 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitation "said backbone" in the newly added limitation. There is insufficient antecedent basis for this limitation in the claim.

Claim 1 recites n=0-3, which makes the formula I and II without having any sulfonated groups when n=0. Examiner believes that the added limitation, 'proviso that at least one SO3R group is present...' will not remedy the "n=0 problem" of the formula of claims 1 and 2 because it only further confuses the issue. Applicant needs to replace the 'n' with 'n1' and 'n2' to clear this problem.

Claim 23, the wherein clause of n up to 3 has a problem: at n=0, there would be nothing. (0 is an integer: Webster dictionary). Examiner believes that there is no need to define 'n' in this formula because it is a common practice to provide the formula of the repeat unit in square brackets with a subscript 'n' to represent a polymer.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1,2,19-22 and 25-44 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

With respect to claim 1, in the newly added element 'proviso that at least one SO3R group is present in said backbone': 'said backbone' has no antecedent basis. Without an antecedent basis, the word 'backbone' for a polymer would be considered as the main chain of the polymer. There is no SO3R group in the main chain of the polymer as originally disclosed and claimed. SO3R is a pendent group attached to an aryl group in the main chain. Also, chemically, SO3R cannot form a part of the main chain.

Claim Rejections - 35 USC § 102

> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claims 1,2,19-22,25,27, 28 and 33- 39 are rejected under 35 U.S.C. 102(b) as being anticipated by Ozcayir et al (US 5,618,334).

Ozcayir teaches membranes containing the repeat units (I) and (II) of claims 1 and 2 in columns 2-5. See especially the formula between lines 35 and 40 of col 4. The reference anticipates the claims at least when m=n=0. The 'polyetherketone' recited in the preamble does not add to the claim limitation other than just a name because at m=0, the formula of claims 1 and 2 are not polyether ketones. Even when m is not zero, it still may not represent a polyether ketone because X (the only point where a keto group can exist in the formula) can be several other groups, and cannot be –CO- and something else at the same time. Ion exchange capacity would be inherent – polymer has the SO3H groups. Also see col 7 lines 15-30. X can be –CO- as in claim 19 (see col 4 lines 50-55), Ar1 and Ar2 can be phenylene or biphenylene as in claim 20, further comprise repeat unit (III) of claim 21, molar proportion of the repeat units (I) and (III) overlaps the range 10-50% and 90-50% respectively as in claim 22 (see col 2 line 15-25), ion exchange capacity falls in the range between 0.5 and 3.0 meq/g as in claim 37 (col 7 lines 15-30), a membrane comprising a sulfonated polymer as in claim 25 (abstract), polymer component is sulfonated (abstract) as in claim 27. Thickness within 10 and 150 microns as in claim 28 (col 7 lines 40-45)

Ar1 and Ar2 are 1,3-phenylene or 1,4-phenylene as in claims 33 and 34, further comprises the repeating formula (III) of claim 35 (see col 4 lines 35-40), formula II and III range overlaps 10-50% and 50-90% respectively as in claim 36, (col 2 lines 15-25); forms of the polymer in Li salt form (see Table) as in claim 39. Membrane comprises a

polyether sulfone, and has thickness in the range 20 and 60 microns as in claim 38 (see structures in cols 2-5; col 7 lines 40-45).

2. Claim 26 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ozcayir (334).

Proton conductivity of the membrane, being same material as in the instant claim, is an inherent property of the membrane. Where applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the examiner may make a rejection under both 35 U.S.C. 102 and 103, expressed as a 102/103 rejection. "There is nothing inconsistent in concurrent rejections for obviousness under 35 U.S.C. 103 and for anticipation under 35 U.S.C. 102." In re Best, 562 F.2d 1252, 1255 n.4, 195 USPQ 430, 433 n.4 (CCPA 1977). This same rationale should also apply to product, apparatus, and process claims claimed in terms of function, property or characteristic. Therefore, a 35 U.S.C. 102/103 rejection is appropriate for these types of claims as well as for composition claims.)

3. Claims 1,2,19-22, 24,25,27-30, 32-37 and 39 are rejected under 35 U.S.C. 102(a/e) as being anticipated by Helmer-Metzmann et al (US 5,834,566)

Helmer-Metzmann teaches membranes containing the repeat units (I) and (II) of claims 1 and 2: see formula V in col 4 fo the reference. At least when m = n= 0 in formula I and II of the claim, formula (V) of the reference anticipates the claims. (Please

note that the -SO2-Ar- part in formula V of the ref can be ignored because the claim is open-ended). Ion exchange capacity would be inherent – polymer has the SO3H groups. (See Tables) The proviso of having an SO3R group is anticipated by the middle lines of col 4. X can be –CO- as in claim 19, Ar1 and Ar2 can be phenylene or biphenylene as in claim 20, further comprise repeat unit (III) of claim 21, molar proportion of the repeat units (I) and (III) overlaps the range 10-50% and 90-50% respectively as in claim 22 (see col 4), ion exchange capacity falls in the range between 0.5 and 3.0 meq/g as in claim 37 (Tables), a membrane comprising a sulfonated polymer as in claim 25 (abstract), polymer component is sulfonated (abstract, cols 3 and 4) as in claim 27.

Claim 29 recites the method for making the membrane using the polymer of claim 1, which Helmer-Metzmann teaches in Examples 1-20 by dissolving in NMP, coating on a support and then drying. Solvent in NMP, concentration of polymer is 10% as in claim 30. Water washing as in claim 32.

Ar1 and Ar2 are 1,3-phenylene or 1,4-phenylene as in claims 33 and 34, further comprises the repeating formula (III) of claim 35 (see col 4), formula II and III range overlaps 10-50% and 50-90% respectively as in claim 36, (col 4); forms of the polymer in Na or K salt form (see examples) as in claim 39. Membrane comprises a polyether sulfone, and has thickness in the range 20 and 60 microns as in claim 38 (see structures in cols 2-5; col 7 lines 40-45).

4. Claim 26 is rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Helmer-Metzmann (566).

Proton conductivity of the membrane, being same material as in the instant claim, is an inherent property of the membrane. Where applicant claims a composition in terms of a function, property or characteristic and the composition of the prior art is the same as that of the claim but the function is not explicitly disclosed by the reference, the examiner may make a rejection under both 35 U.S.C. 102 and 103, expressed as a 102/103 rejection. "There is nothing inconsistent in concurrent rejections for obviousness under 35 U.S.C. 103 and for anticipation under 35 U.S.C. 102." In re Best, 562 F.2d 1252, 1255 n.4, 195 USPQ 430, 433 n.4 (CCPA 1977). This same rationale should also apply to product, apparatus, and process claims claimed in terms of function, property or characteristic. Therefore, a 35 U.S.C. 102/103 rejection is appropriate for these types of claims as well as for composition claims.)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 29-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ozcayir (334).

Claim 29-31 recites the method for making the membrane, which Ozcayir teaches in col 7 lines 37-54. Ozcayir is not specific whether the polymer is with sulfonic acid groups are alkali metal form. However, Ozcayir teaches both forms (see examples). Also the H-form or the alkali/alkali earth metal form should be equivalent. In this case, the prior art element performs the identical function specified in the claim in substantially the same way, and produces substantially the same results as the corresponding element disclosed in the specification. Kemco Sales, Inc. v. Control Papers Co., 208 F.3d 1352, 54 USPQ2d 1308 (Fed. Cir. 2000). Aprotic solvent as in claim 29 and DMF, DMSO etc as in claim 30 (see col 7 lines 37-53 and examples). Converting from salt to acid form as in claim 31 – see col 7 lines 14-25.

6. Claims 32 and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ozcayir (334) in view of Bikson et al (US 5,364,454).

Ozcayir teaches all the limitations of claim 29 as above, except the washing. Bikson teaches that the method of making membranes from aromatic sulfonated polymers is well known (see col 1 lines 35-40), and therefore, it would be obvious to one of ordinary skill in the art at the time of invention to use such well known method to make the membrane, washing included.

7. Claims 41-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ozcayir (334) in view of Kawakami et al (4,971,695).

Ozcayir teaches all the limitations of claim 25. Instant claims are combination of the membrane of claim 25 with fuel cells, capacitor and dialysis apparatus, which Ozcayir fails to teach. Kawakami teaches use of sulfonated hexafluoro polymer membranes in applications of electrochemical membrane (fuel cell, capacitors), such as electrodialysis as a dialysis membrane; and as battery separator membranes (fuel cells, capacitors), etc. (see col 2 lines 28-33). It would be obvious to one of ordinary skill in the art at the time of invention that the membrane of Ozcayir is also applicable in such applications as Kawakami teaches, since they are of similar material and of similar characteristics (see examples of Kawakami).

8. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Helmer-Metzmann (566).

Helmer-Metzmann teaches all the limitations of claim 29. Claim 31 adds the further limitation of converting salt form to acid form by acid treatment, on which Helmer-Metzmann is silent, but teaches that the acid form can be converted to salt form by treating with NaOH, etc. (see col 8 and tables). However, it would be obvious to one of ordinary skill in the art at the time of invention that the salt form of an ion exchange membrane (sulfonated) can be converted in turn to acid form by treatment with acid.

9. Claims 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Helmer-Metzmann (566) in view of Bikson et al (US 5,364,454).

Helmer-Metzmann (566) teaches all the limitations of claim 32 as above, except the washing with mineral acid in water. Bikson teaches that the method of making membranes from aromatic sulfonated polymers is well known (see col 1 lines 35-40), and therefore, it would be obvious to one of ordinary skill in the art at the time of invention to use such well known method to make the membrane, washing medium included.

10. Claims 28, 38 and 41-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Helmer-Metzmann (566) in view of Kawakami et al (4,971,695).

Helmer-Metzmann teaches all the limitations of claim 25. Claims 28 and 38 add the further limitation of the membrane thickness being 10-150 microns or 20-60 microns. Helmer-Metzmann (566) does not teach the membrane thickness. Kawakami teaches the thickness as between 0.5 to 10 mil (see col 5 lines 35-45). Claims41-44 are combination of the membrane of claim 25 with fuel cells, capacitor and dialysis apparatus, which Helmer-Metzmann fails to teach. Kawakami teaches use of sulfonated hexafluoro polymer membranes in applications of electrochemical membrane (fuel cell, capacitors), such as electrodialysis as a dialysis membrane; and as battery separator membranes (fuel cells, capacitors), etc. (see col 2 lines 28-33). It would be obvious to one of ordinary skill in the art at the time of invention to use the teaching of Kawakami in the teaching of Helmer-Metzmann for use of the membrane in the applications as taught by Kawakami because of the high thermal and mechanical stability above 100 deg C - see Helmer-Metzmann abstract.

Re the further limitations of claim 38, the polyether sulfone and polyether ketone are taught by Helmer-Metzmann (566) – col 4.

Allowable Subject Matter

Claim 23 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

The following is a statement of reasons for the indication of allowable subject matter: The closest prior art is Ozcayir (334) which teaches sulfonated polyimides. Claim 23 recites a polymer consisting essentially of a specific repeat unit, and such a polymer is not taught by the references, and is non-obvious to polymers disclosed in the references because of its unique structure.

Response to Arguments

Applicant's arguments filed 12/6/04 have been fully considered but they are not persuasive.

(1) In response to the argument that the polymer backbone is a polyether ketone: The formula of claim 1 does not indicate any ketone group (-CO-) group other than –X-, which can be only one of a list of several groups, and cannot be a ketone group if it is something else. **Applicants need to seriously review the formulae recited in the claims for errors.**

(2) In response to the argument that the '695 reference is for sulfonated polysulfones: This argument is also not understood, because the claims were rejected

based on the '566 patent. Kawakami'695 was used only for the membrane thickness and intended use in claims 28,38 and 41-44. Having said that, Kawakami '695 teaches the –C(CF3)2- group in the polymer backbone in the abstract itself and in every formula shown in the reference. Unfortunately, the applicants' formulae in the claims represent this types of compounds as equally as polyether ketones, and even this reference anticipates the claims 1 and 2 at least when m=n=0. The SO2 group in the formulae of the reference can be ignored because the claims are open-ended. The only possible ketone link in the claim is at –X-, which disappears when m=0.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Krishnan S Menon whose telephone number is 571-272-1143. The examiner can normally be reached on 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wanda L Walker can be reached on 571-272-1151. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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